IN THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1(Currently Amended). A transceiver for discrete multitone communications, comprising:

analog circuitry coupled to a communications facility, for transmitting and receiving analog signals in the time-domain over a transmission channel;

a coder/decoder coupled to the analog circuitry, for filtering received signals and for presenting a time-domain digital datastream, the datastream representative of modulating digital symbols in a plurality of frequency subchannels;

a digital transceiver, coupled to the analog front end, for digitally processing the datastream according to a sequence of operations, to retrieve a digital payload, the operations comprising:

applying a time-domain equalizer to the datastream, the time-domain equalizer corresponding to a digital filter having coefficients derived according to a mean-squared error minimization that is constrained according to a weighted spectral flatness term, wherein the weighted spectral flatness term is: $\text{flatness} = \int_{-\pi}^{\pi} \left\| W(e^{j\omega}) - \Delta_k(e^{j\omega}) \right\|^2 d\omega$;

then performing a discrete Fourier transform to recover the symbols from each of the plurality of subchannels; and

applying a frequency domain equalizer to the output of the discrete Fourier transform operation, to remove a frequency response corresponding to the response of the transmission channel from the signal.

2(Original). The transceiver of claim 1, wherein the digital transceiver comprises a digital signal processor.

3(Original). The transceiver of claim 1, wherein the signal that is received by the transceiver periodically includes a cyclic prefix formed by the prepending of a terminal portion of each block of transmitted symbols;

and wherein the digital transceiver is also for performing the operation of removing the cyclic prefix from the datastream, prior to the step of performing the discrete Fourier transform.

4(Original). The transceiver of claim 1, wherein the plurality of subchannels are in a first frequency band;

wherein the transceiver is also for transmitting signals over the communications facility in a second, non-overlapping, frequency band;

and wherein the analog front end includes filters for attenuating the second frequency band from the received signals.

5. Canceled.

6(Currently Amended). A method of training a time domain equalizer in a receiving modem, comprising the steps of:

receiving a training signal;

regenerating the training signal in the receiving modem;

operating a digital circuit in the receiving modem to derive coefficients for a time-domain equalizer digital filter from the received and regenerated training signals, by performing a minimization process constrained by a weighted spectral flatness term in the frequency domain of the equalizer characteristic, wherein the weighted spectral flatness term is:

$$\text{flatness} = \int_{-\pi}^{\pi} \left\| W(e^{j\omega}) - \Delta_k(e^{j\omega}) \right\|^2 d\omega \text{ ; and}$$

storing a filter vector based on the derived coefficients, for use in a time-domain equalizer digital filter.

7(Original). The method of claim 6, wherein the operating step comprises:

deriving correlation matrices from the received and regenerated training signals;

deriving eigenvectors and eigenvalues for a combination of the correlation matrices;

evaluating a cost function including a mean squared error term and a weighted spectral flatness term, the evaluating being performed using the derived eigenvectors and eigenvalues, over multiple trial values of a weighting constant;

selecting a value of the weighting constant that provides a minimum value of the cost function; and

then deriving an optimal filter vector using the selected weighting constant value.

8(Original). The method of claim 7, wherein the multiple trial values of the weighting constant have values between a minimum eigenvalue and a maximum eigenvalue.

9(Currently Amended). A method of recovering a signal from a transmitted analog signal, comprising the steps of:

receiving, over a transmission channel, an analog signal corresponding to modulated digital symbols in a plurality of frequency subchannels;

analog-to-digital converting the analog signal into a discrete datastream;

applying a time-domain equalizer to the datastream, the time-domain equalizer corresponding to a digital filter having coefficients derived according to a mean-squared error minimization that is constrained according to a weighted spectral flatness term, wherein the weighted spectral flatness term is: $\text{flatness} = \int_{-\pi}^{\pi} \left\| W(e^{j\omega}) - \Delta_k(e^{j\omega}) \right\|^2 d\omega$;

applying a discrete Fourier transform to the equalized datastream to recover symbols from each of the plurality of subchannels; and

applying a frequency domain equalizer to remove a channel response of the transmission channel.

10(Original). The method of claim 9, further comprising:

after the step of applying a time-domain equalizer and before the step of applying a discrete Fourier transform, removing a cyclic prefix from each of a plurality of blocks of symbols in the datastream.

11(Original). The method of claim 9, further comprising:

prior to the receiving step, training the time domain equalizer by performing a plurality of operations comprising:

receiving a training signal over the transmission channel;

locally regenerating a replica training signal;

operating a digital circuit to derive coefficients for a time domain equalizer digital filter from the received and regenerated training signals, by performing a minimization process constrained by a spectral flatness in the frequency domain of the equalizer characteristic; and

storing a filter vector based on the derived coefficients, for use in the time-domain equalizer digital filter.

12(Original). The method of claim 11, wherein the operating operation comprises:

deriving correlation matrices from the received and regenerated signals;

deriving eigenvectors and eigenvalues for a combination of the correlation matrices;

evaluating a cost function including a mean squared error term and a weighted spectral flatness term, the evaluating being performed using the derived eigenvectors and eigenvalues, over multiple trial values of a weighting constant;

selecting a value of the weighting constant that provides a minimum value of the cost function; and

then deriving an optimal filter vector using the selected weighting constant value.

13(Currently Amended). A digital transceiver for digitally processing a discrete multitone time-domain datastream representative of modulating digital symbols in a plurality of frequency subchannels to retrieve a digital payload, according to a sequence of operations comprising:

applying a time-domain equalizer to the datastream, the time-domain equalizer corresponding to a digital filter having coefficients derived according to a mean-squared error minimization that is constrained according to a weighted spectral flatness term, wherein the weighted spectral flatness term is: $\text{flatness} = \int_{-\pi}^{\pi} \left\| W(e^{j\omega}) - \Delta_k(e^{j\omega}) \right\|^2 d\omega$;

then performing a discrete Fourier transform to recover the symbols from each of the plurality of subchannels; and

applying a frequency domain equalizer to the output of the discrete Fourier transform operation, to remove a frequency response corresponding to the response of the transmission channel from the signal.

14(Original). The digital transceiver of claim 13, wherein the sequence of operations further comprises:

removing, from the datastream prior to the performing of the discrete Fourier transform, a cyclic prefix corresponding to the periodic prepending of a terminal portion of each of a sequence of blocks of transmitted symbols.

15(Original). The digital transceiver of claim 13, wherein the coefficients of the digital filter of the time-domain equalizer are selected by minimizing a weighted combination of the spectral flatness constraint with a mean squared error term.

16(Original). The digital transceiver of claim 13, wherein the digital transceiver comprises a digital signal processor that is programmed to perform the plurality of operations.